

## 火道を上昇するマグマ内における水の減圧発泡に関する理論的研究 -粘性項を含む核形成速度の導出と気泡数密度の再評価- (2)

### A new formulation of viscosity-included bubble nucleation rate in ascending magmas and re-estimation of bubble number density (2)

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To evaluate the effect of melt viscosity on bubble nucleation, we newly formulate homogeneous nucleation rate of water bubbles to explicitly include melt viscosity. The viscosity appears in the pre-exponential factor of the nucleation rate in terms of the Péclet number: the ratio of bubble growth timescale by molecular diffusion and viscous relaxation timescale. The pre-exponential factor linearly decreases with increasing viscosity (or decreasing Péclet number) under a given supersaturation. We numerically solve the evolution of bubble nucleation and growth processes in ascending magmas by using the new formula of nucleation rate and a precise approximation of moment equations of bubble size distribution function. In high viscosity or high decompression rate region, the effect of melt viscosity reduces bubble number density by several orders of magnitude compared with the previous study. Because of the lack of experimental data in this high-viscous regime, the reality of this regime will be verified by future experiments.

キーワード：気泡核形成、気泡成長、気泡数密度、気泡サイズ分布、ペクレ数

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